ABSTRACT

Title of thesis: The Association between Cultural Views of Cancer and Colorectal Cancer Screening Behavior among Asian Americans in the Washington, D.C. Metropolitan Area

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Objective: To evaluate the association between Asian cultural views of cancer and colorectal cancer screening behavior among Asian Americans in the Washington, D.C. metropolitan area. Methods: A cross-sectional examination was conducted of 858 Chinese, Korean, and Vietnamese adults. Logistic regression was used to investigate the relationship between Asian cultural views (using 16-items from a previously developed scale) and colorectal cancer screening (self-reported yes/no). Results: When examining 10-point increases in continuous cultural views scores, a 12% (OR=0.88; 95% CI:0.82-0.97) and 7% (OR=0.93; 95% CI:0.87-1.00) decreased likelihood that an individual received screening were observed for herb use and self-care scores respectively. When examining categorical cultural views scores (Asian, Neutral, and Western), herb use and self-care were significantly associated with screening and showed a gradient effect after adjusting for age. Conclusion: Findings suggest that culturally appropriate interventions that address specific cultural views of cancer can potentially increase colorectal cancer screening among Asian Americans.

THE ASSOCIATION BETWEEN CULTURAL VIEWS OF CANCER AND COLORECTAL CANCER SCREENING BEHAVIOR AMONG ASIAN AMERICANS IN THE WASHINGTON, D.C. METROPOLITAN AREA

By

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Chapter 1: Introduction

Traditional cultural beliefs and values are strongly held among Asian Americans and can have a significant role in cancer screening behaviors.[1, 2] Cultural values have been found to affect cancer communication and screening in Asian Americans.[1] Findings from prior research suggest that these cultural values may inhibit individuals from seeking Western medicine for help and influence perceptions of health and cancer.[2-7] Although cultural views and values are likely to influence cancer beliefs, attitudes, and behaviors, few studies have examined the impact of culture on cancer screening among Asian Americans, never the less colorectal screening.[1, 4, 8-10]

The Centers for Disease Control and Prevention (CDC) asserts that regular screening beginning at age 50 is key in the prevention of colorectal cancer.[11] In addition, studies have found reduced mortality from colorectal cancer as well as detection of colorectal cancer at earlier stages among those who receive annual screening.[12,13] The U.S. Preventive Services Task Force (USPSTF) recommends that adults aged 50 to 75 years receive high-sensitivity fecal occult blood testing (FOBT) annually, sigmoidoscopy every five years, or colonoscopy every 10 years.[14] Despite the literature and recommendations from the USPSTF, Asian Americans have been found to report low rates of colorectal screening.[15] According to data from the 2010 Behavioral Risk Factor Surveillance System, only 55.1% of Asian American and Pacific Islanders were up-to-date with colorectal cancer screening as compared to 66.3% for white Americans and 65.0% for African Americans.[15]

1.1 Research Questions

Considering the low rates of colorectal cancer screening among Asian Americans, a greater cultural understanding is needed of screening behaviors within this population. This thesis aims to examine the association between Asian cultural views of health and cancer on colorectal screening behavior among 858 Chinese, Korean, and Vietnamese adults in the Washington, D.C. metropolitan area. The research questions and hypotheses for the current study are as follows:

1. Is there an association between Asian cultural views of cancer (taking into account the subscales of fatalism, use of herbs, self-care, and western medicine) and colorectal screening behaviors for Chinese, Korean, and Vietnamese Americans?

   Hypothesis 1: Asian cultural views will be associated with colorectal screening across ethnic groups, particularly for the fatalism domain.

2. Is having Asian cultural views of cancer independently associated with lower colorectal cancer screening after controlling for potential confounders?

   Hypothesis 2: Those with more Asian cultural views of health and cancer will be less likely to have had a colorectal screening test within the last two years, even when controlling for confounders.

3. Are there interactions between Asian cultural views of cancer and potential effect modifiers, such as education?

   Hypothesis 3: Based on the literature, it is expected that the influence of Asian cultural views on colorectal screening will be stronger among those with low educational attainment as compared to those with high educational attainment.

Specifically, those who hold Asian cultural views of cancer and have less than a high school education will be less likely to receive colorectal screening as compared to those who hold Asian cultural views but have a greater than high school education.

Chapter 2: Background

2.1 Importance of the Study

Among Asian Americans, colorectal cancer has the second highest incidence and mortality rates as compared to those of all other cancers.[16] In relation to specific Asian ethnic groups, colorectal cancer ranks in the top four for cancer incidence rates and in the top five for cancer mortality rates among Chinese, Korean, and Vietnamese Americans.[17] Although cultural competency is accepted as being a key factor in reducing health disparities, the concept of culture in relation to cancer is not well understood.[18] Culture influences people's perceptions of cancer risk and has been documented to influence cancer prevention and screening behavior in addition to living, coping, and dying of cancer.[18, 19] The current study is important in that its findings will help elucidate the relationship between cultural views of health and cancer in relation to colorectal screening and can be used to develop future interventions for Chinese, Korean, and Vietnamese Americans that address these cultural views. By enhancing the knowledge of culture in relation to colorectal cancer screening behavior, communication, which is critical to decreasing cancer-related misconceptions, increasing cancer awareness about prevention, and disseminating cancer education, can be improved.[20]

2.2 Literature Review

2.2.1 Asian Cultural Views of Cancer

Cultural beliefs and norms are known to strongly influence participation in early detection and screening services in addition to social attitudes toward cancer

and compliance with treatment.[21] In the current literature, the 30-item scale developed by Liang et al. appears to be the only validated scale to measure Asian cultural views of health and cancer. This scale has limitations of its own in that it was developed using responses from a convenience sample of Chinese American women, and most subscales consist of only two to three items which can reduce intra-item reliability.[1] As a result, this scale may not capture all Asian cultural views related to health and cancer, particularly for other Asian ethnic groups.

The scale was developed from focus groups of a total of 54 Chinese American women, who provided input regarding their perceptions of health and illness; knowledge and beliefs about cancer; barriers to cancer screening; and screening and healthcare experiences in the U.S.[4] With respect to cancer prevention, women expressed a sense of fatalism regarding cancer, stating that they have "no control of life and death" or that "what will happen will happen". A lack of English capability was noted as being a major barrier to healthcare, and a physician's recommendation was identified as the most important reinforcing factor for cancer screening.[4]

In another study conducted by Lee et al., face-to-face interviews were conducted with 26 Korean immigrants aged 50 and older to assess their health and cultural beliefs regarding colorectal cancer and screening behaviors.[22] The following themes arose in relation to colorectal cancer and screening: valuing their families before themselves, seeing a doctor only if they have symptoms, believing that they would not get colorectal cancer, balancing the will to stay healthy and fatalism, and refusing health information.[22] The notion of not seeking

medical help when symptoms are not experienced closely relates to the domain of "self-care" measured in the cultural views scale developed my Liang et al. In addition, many participants alluded to the idea of fatalism, which is also a domain measured in the scale, stating that they related colorectal cancer to death.[22] Similar research examining cultural views of Vietnamese Americans in relation to colorectal cancer and screening was not found in the literature.

2.2.2 Colorectal Cancer Screening

The current recommendations from the U.S. Preventive Services Task Force (USPSTF) suggest that adults aged 50 to 75 years should receive high-sensitivity fecal occult blood testing (FOBT) annually, sigmoidoscopy every five years, or colonoscopy every 10 years.[14] In the literature, colorectal cancer screening has been measured by asking if the participant has "ever received colorectal cancer screening" or in greater depth by asking about the specific colorectal screening tests (i.e., FOBT, sigmoidoscopy, and colonoscopy) and how recently these tests were received.[10, 23] Self-reports of colon cancer screening behavior have been found to be relatively reliable.[24]

Most studies to date that examine colorectal cancer screening among Asian Americans focus on the current practices and barriers, often excluding Asian cultural views of health and cancer.[25] In a study of 206 Chinese Americans, participants were asked about colorectal cancer screening behaviors and beliefs about perceived risk of developing cancer and treatment efficacy.[26] A physician's recommendation to receive colorectal screening was found to be significantly associated with whether Chinese Americans undergo FOBT, sigmoidoscopy, or

colonoscopy screening. In another study examining 203 Chinese Americans, receipt of a FOBT within the past year was associated with fewer years of U.S. residency, lower levels of worries or fears of test results, and higher levels of perceived susceptibility to colorectal cancer. Moreover, receipt of a flexible sigmoidoscopy within the past 5 years was associated with higher levels of education, lower levels of worries or fears of test results, and higher levels of perceived susceptibility of colorectal cancer screening.

In a study consisting of face-to-face interviews with 205 Korean American aged 60 and older, government assistance, routine checkups, having insurance, and speaking fluent English were associated with having FOBT, while marital status, proportion of time spent in the U.S., and general health status were related to having a sigmoidoscopy.[27] Among 151 Korean Americans aged 40 to 70, barriers to colorectal cancer screening were lack of health insurance and inability to afford testing, not knowing where to go for testing, language barrier, and fear of being a burden to the family.[28] In another survey of 229 Korean female immigrants aged 50 years and older, only 38% of the women reported having colorectal cancer screening (blood stool test within the past 12 months or sigmoidoscopy/colonoscopy within the past 5 years).[29] Higher percentage of lifetime spent in the U.S. and ever having had a checkup when no symptoms were present were found to be independently associated with adherence to cancer screening.[29]

In a study comparing 239 Vietnamese Americans with 310 White Americans, Vietnamese Americans were found to be more concerned that a

screening test would find cancer than were White Americans, which contributed to avoidance of screening.[25] There was low knowledge of colorectal polyps, with only 29% of Vietnamese having heard of one.[25] Vietnamese were less likely to have had sigmoidoscopy in the past 5 years, but were more likely to plan to have sigmoidoscopy in the next 5 years than were whites.[25] In a cross-sectional sample of 867 Vietnamese aged 50 to 74, the rates of colorectal screening recognition, receipt, and intention were found to be low with only half of the respondents recognizing FOBT and only about a third recognizing sigmoidoscopy or colonoscopy.[30] The rates of receipt of sigmoidoscopy or colonoscopy were found to be less than 25%.[30]

2.2.3 Cultural Views and Cancer Screening

The full 30-item cultural views scale has been used in three cross-sectional studies examining cancer screening. One study was conducted among 466 Chinese American women in the Washington, D.C. area.[8] After controlling for risk perception, worry, physician recommendation, family encouragement, and access barriers, women holding a more Asian cultural view of cancer were found to be significantly less likely to have regular mammography adherence.[8] The next study examined the influence of Asian cultural views on cervical cancer screening among 473 Chinese women aged 50 and older. After adjusting for sociodemographics, cancer worry, physician recommendation, health insurance, and access barriers, cultural views and English proficiency were found to be significant predictors of older Chinese American women having regular Pap tests.[9]

The first study to examine Asian cultural views of cancer on colorectal screening was conducted by Wang et al.[10] A sample of 433 Chinese American women ages 50 years and older, were considered to have screening adherence if they had received a fecal occult blood test (FOBT) within a year, sigmoidoscopy within five years, or colonoscopy within 10 years.[10] Responses were then used to create two outcome categories: current screeners and noncurrent screeners. The key findings from this study were that women with more Asian cultural views were less likely to be current screeners, women who thought about the chance of getting colon cancer had approximately three-fold greater odds of being current screeners than women who never thought about colon cancer, and women receiving a physician recommendation for colon cancer screening had more than three-fold increased odds of being current screeners than those who had not received a recommendation.[10]

Another study including 104 Asians and 4,103 whites, found that fatalism was a significant predictor for not adhering to colorectal screening guidelines when examining data from the Health Information National Trends Survey (HINTS).[31] Asians were nearly 6 times more likely than whites to think that there is not much they can do to lower their chances of getting colon cancer (OR=5.64, 95% CI: 5.62-5.67), and when views of fatalism were adjusted for, Asians' adherence to colon cancer screening became 2 times greater than that of whites' (OR=2.04, 95% CI: 2.02-2.05). Fatalism in this study was measured using 4 statements to which participants agreed or disagreed: there is nothing you can do to lower chances of getting colon cancer, everything causes colon cancer, colon

cancer is often caused by a person's behavior/lifestyle, and there are ways to slow down colon cancer. The authors did not specify which Asian subgroups were included in the aggregate data.

There are several gaps in the current literature in respect to the relationship between Asian cultural views of cancer and colorectal cancer screening. There is very limited research that examines Asian cultural views and cancer screening behaviors, and most focus primarily on Chinese American women. In addition, there is little to no research conducted among Korean and Vietnamese Americans in this topic area. This study contributes to the literature by helping to fill these gaps in the existing literature.

Chapter 3: Methods

3.1 Study Design

The data for this study was originally from a randomized community-based intervention trial that was implemented by the Asian American Liver Cancer Education Program. This program was funded by the National Cancer Institute (R25CA129042) and conducted through collaborative efforts between the Johns Hopkins Bloomberg School of Public Health and the University of Maryland School of Public Health.

The liver cancer prevention education was provided from November 2009 to June 2010 to Chinese, Korean, and Vietnamese adults in the Washington, D.C. metropolitan area. A convenience sample of 877 participants was obtained through targeted recruitment methods using input from a community advisory board. Participants were recruited through both community-based organizations, such as language schools, and faith-based organizations, such as churches. Other recruitment locations included nail salons, universities, as well as Asian grocery markets and restaurants. Flyers, email list servers, and local newspapers were also used as additional recruitment outlets. Participants were considered to be eligible for the study if they met the following criteria: (1) self-identified as being Chinese, Korean, or Vietnamese; (2) were 18 years of age or older; and (2) had never participated in another hepatitis B or liver cancer educational program.

All participants completed questionnaires containing items on demographics, general health, hepatitis B related information (e.g., screening, vaccination, and knowledge), health care access and utilization, acculturation,

health behaviors (e.g., health examination and cancer screening behaviors), mental health, cultural views of cancer, and health literacy. The section on health behavior included an item on colorectal cancer screening, which was used for the analysis in this study. Given the nature of the data, the current study followed a cross-sectional design.

3.2 Human Subjects

The Institutional Review Boards of Johns Hopkins Bloomberg School of Public Health and University of Maryland, College Park approved the parent study, which was conducted by the Asian American Liver Cancer Education Program. Approval for the current study was obtained from the Institutional Review Board of the University of Maryland, College Park. The confidentiality of the participants was maintained through the use of participant identification numbers that were not linked to any personal identifiers.

3.3 Description of Variables

3.3.1 Independent Variable

In order to measure Asian cultural views of health and cancer, a validated scale for Chinese cultural views developed by Liang et al. was used.[1] In a previous study, the overall 30-item scale was found to have good reliability (Cronbach's $\alpha = 0.79$). The scale consists of the following seven cultural subscales: fatalism, self-care, use of herbs, lifestyle, hot-cold balance, medical examination, and Western medicine (Cronbach's $\alpha = 0.39$ to 0.82). However, only fatalism (Cronbach's $\alpha = 0.82$), self-care (Cronbach's $\alpha = 0.73$), use of herbs (Cronbach's $\alpha = 0.69$), and Western medicine (Cronbach's $\alpha = 0.39$) were

examined in this study given that the dataset only contained items for these domains. The questionnaire used in the Asian American Liver Cancer Education Program consisted of only four of the sub-scales so as to reduce the burden on participants. Therefore, a total of 16 items was used to assess Asian cultural views of health and cancer: 9 items for fatalism, 2 items for self-care, 3 items for use of herbs, and 2 items for Western medicine. Initially, the self-care domain consisted of three items instead of two. However, the third was excluded in order to improve the domain's reliability. After exclusion, the Cronbach's alpha for self-care increased from 0.63 to 0.73 (see appendix A).

The cultural views items were summed to calculate subscale scores and an overall Asian cultural views score. The cultural views scores were then normalized from 0 to 100 points and treated as both continuous and categorical variables for greater ease of interpretation. When examining subscale scores and overall scores, higher scores on the Asian cultural views scales suggest a more Asian view of health and cancer, whereas lower scores indicate a more Western view of health and cancer.

3.3.2 Dependent Variable

Colorectal cancer screening behavior was measured by a single item found in the health behaviors section of the questionnaire. Participants were asked to check either "yes" or "no" when asked whether or not they had received screening for colon cancer (e.g., sigmoidoscopy or colonoscopy) in the last two years.

3.3.3 Potential Confounders

Based on the existing literature, the following potential confounders were included in the analysis: demographics (such as age, gender, ethnicity, and marital status), socioeconomic status (as measured by education and income), healthcare factors (such as having a regular physician and health insurance), general health status, and acculturation. Marital status was categorized into three groups: married (consisting of married, living with a partner, and remarried), unmarried (consisting of separated, divorced, and widowed), and never been married. In addition, acculturation was measured by the revised version of Suinn-Lew Asian Self-Identity Acculturation Scale (SL-ASIA), which includes 10 items on language, ethnic origin of friends and peers, music preference, food choice, and self-identity.[32]

3.4 Data Analysis

The statistical analysis for this study was comprised of secondary data analysis. First, descriptive analysis was performed to check for missing values and to examine the distributions of the independent variable, dependent variable, and covariates. Individuals missing responses for the colorectal cancer screening item (n= 3) and two or more cultural views items (n= 17) were excluded to obtain a final analytic sample of 858 subjects. One individual was missing a response for the screening item and missing two or more of the cultural views items resulting in the exclusion of 19 subjects overall. For covariates that were missing 0.1 to 0.4% of responses, including marital status (4 missing out of 858), health status (1 missing out of 858), and having a regular physician (1 missing out of

858), the missing values were placed into the most frequent categories. A separate missing category was made for income, which was missing about 3.7% of responses (32 missing out of 858). The characteristics of participants, which include means and standard deviations (SD) for the continuous variables and frequencies and percentages for the categorical variables, are summarized in Table 1. Normality of the Asian cultural views scores was assessed using the Shapiro-Wilk test. All Shapiro-Wilk statistics, which ranged from 0.94 to 0.99, had p-values less than 0.0001 indicating that all scores were non-normally distributed. Thus in Table 1, medians and interquartile ranges were reported for the Asian cultural views scores, and nonparametric Kruskal-Wallis tests were used to determine the p-values.

The influence of Asian cultural views on colorectal screening was examined by each item, each subscale (fatalism, use of herbs, self-care, and notions about western medicine), and collectively as an overall score. Mean substitution was employed for subjects who had one missing response for the cultural scales items. Missing values were replaced with the average of the non-missing items with in each subscale. The Asian cultural views scores were examined as both continuous and categorical variables. Scores were categorized into the following three groups for more convenient interpretation: Asian, Neutral, and Western. In order to establish the cutoff points for the Asian cultural views scores, the frequency distributions for each subscale score and the overall score were evaluated prior to additional analysis.

Bivariate analysis was conducted to identify potential confounders in the study by examining the relationships between each covariate and colorectal cancer screening. Chi-square tests were used for the categorical variables, and t-tests were used for the continuous variables, such as age and SL-ASIA. Next, logistic regression was performed by including covariates one by one to determine confounders adjusting for age, SL-ASIA, gender, ethnicity, education, income, marital status, health status, having health insurance, and having a regular physician individually. The final models included all covariates as a result of examining significance through analysis and based on theory as provided by previous studies. Based on the U.S. Preventive Services Task Force (USPSTF) guidelines for colorectal cancer screening, additional analysis was run in the same way for a subset of the data, which consisted of subjects aged 50 years and older.

Multicollinearity was tested in the final models by examining variance inflation factors (VIFs) and using the standard cutoff value of 10.[33] All VIFs were found to be in acceptable ranges of 1.07 to 3.75 for the continuous scores and categorical scores. Furthermore, interaction was tested between Asian cultural views and the following covariates independently: having health insurance, having a regular physician, gender, ethnicity, education, income, and health status for colorectal cancer screening. However, no interaction terms were found to be significant. The statistical software SAS version 9.3 (SAS Institute Inc., Cary, NC) was used to perform all analysis.

Chapter 4: Results

The sociodemographic characteristics of the final analytic sample are shown in Table 1. The age of participants ranged from 18 to 89 years and the mean age of the sample was approximately 45 years (SD= 13.4). Of the 858 subjects, almost 59% (n= 503) were female and 41% (n= 355) were male. In terms of the sample's ethnic composition, Chinese, Korean, and Vietnamese Americans each contributed to about a third of the sample. In our sample, only 21.3% of Chinese (n=63), 21.2% of Koreans (n=61), and 22.3% of Vietnamese (n=61) reported having had any colorectal cancer screening test in the past two years. The participants were in general highly educated with about 54% (n= 461) having received a college education or higher. In relation to income, more than half of participants reported an annual household income less than $50,000 with 24% (n= 206) having income less than $20,000 and 29% (n= 254) having income between $20,000 and $49,999. The majority of people were categorized as married with almost 77% (n= 657) being married, living with a partner, or remarried. Most participants reported good health, having insurance, and having a regular physician.

The median values for the Asian cultural views scores were less than or equal to 50 indicating more Westernized views of health and cancer. Among all scores, self-care had the lowest median of 38 (interquartile range (IQR)= 25-50) and use of herbs (IQR= 33-58) and western medicine (IQR= 38-63) had the highest median of 50. The median for the overall score was 42 (IQR= 33-52) suggesting that the study sample, on average, holds more Western cultural views. Based on nonparametric Kruskal-Wallis tests, the sample of those who received

colorectal cancer screening and those who did not were not independent for the overall (p=0.587) and western medicine scores (p=0.380). When examining the unadjusted means and frequencies, those who received colorectal cancer screening within the past two years tended to be older (mean age: 54 vs. 42), less acculturated (mean: 0.05 vs. 0.15), less educated, married (83% vs. 75%), have health insurance (80% vs. 63%), and have a regular physician (78% vs. 54%).

Table 1. Sociodemographic characteristics of the analytic sample (n=858)

	Total n=858		Colorectal Cancer Screening Yes n= 185		No n=673		p-value[a]
Age (mean, SD)	44.8	13.4	54.1	12.7	42.3	12.4	<.0001
SL-ASIA (mean, SD)	0.13	0.54	0.05	0.52	0.15	0.54	<.0001
Gender (n, %)							0.444
Male	355	41.4	72.0	38.9	283	42.1	
Female	503	58.6	113	61.1	390	58.0	
Ethnicity (n, %)							0.943
Korean	288	33.6	61	33.0	227	33.7	
Chinese	296	34.5	63	34.1	233	34.6	
Vietnamese	274	31.9	61	33.0	213	31.7	
Education (n, %)							0.015
less than high school	110	12.8	31	16.8	79	11.7	
high school	177	20.6	49	26.5	128	19.0	
some college	110	12.8	19	9.7	92	13.7	
college graduate or higher	461	53.7	87	47.0	374	55.6	
Annual Household Income (n, %)							0.013
less than $20,000	206	24.0	61	33.0	145	21.6	
$20,000-$49,999	254	29.0	41	22.2	213	31.7	
$50,000-$74,999	111	12.9	27	14.6	84	12.5	
$75,000-$99,999	97	11.3	17	9.2	80	11.9	
$100,000 or more	158	18.4	34	18.4	124	18.4	
Missing	32	3.7	5	2.7	27	4.0	
Marital Status (n, %)							<.0001
Married	657	76.6	154	83.2	503	74.7	
Unmarried	69	8.0	22	11.9	47	7.0	
Never been married	132	15.4	9	4.9	123	18.3	
Health Status (n, %)							0.136
Poor	326	38.0	79	42.7	247	36.7	
Good	532	62.0	106	57.3	426	63.3	
Health Insurance (n, %)							<.0001
No	284	33.1	36	19.5	248	36.9	
Yes	574	66.9	149	80.5	425	63.2	
Regular Physician (n, %)							<.0001
No	349	40.7	41	22.2	308	45.8	
Yes	509	59.3	144	77.8	365	54.2	
Cultural Views (median, IQR)[b]							
Overall	42(33,52)		42(33,52)		42(33,52)		0.587
Fatalism	39(25,50)		42(28,56)		39(25,50)		0.030
Self-care	38(25,50)		25(25,50)		38(25,50)		0.039
Use of herbs	50(33,58)		50(25,58)		50(33,58)		0.018
Western medicine	50(38,63)		50(25,63)		50(38,63)		0.380

[a] The p-values for continuous variables were determined using t-tests and those for categorical variables were determined using chi-square tests.

[b] Medians and interquartile ranges were reported for the Asian cultural views scores, and nonparametric Kruskal-Wallis tests were used to determine p-values.

Univariate logistic regression models were run to calculate the unadjusted odds ratios (OR) and 95% confidence intervals (95% CI) for each Asian cultural views score. The unadjusted odds ratios as well as the age-adjusted odds ratios for the continuous Asian cultural views scores are illustrated in Table 2. For the Asian cultural views scores as continuous variables, the unadjusted odds ratios for fatalism and herb use were found to be statistically significant while that for self-care was found to be marginally significant. However, the overall score and western medicine use were not found to be significantly associated with colorectal cancer screening.

Table 2. Unadjusted and age-adjusted odds ratios from the logistic regression models for continuous cultural views scores and colorectal cancer screening (n=858)

Continuous Asian Cultural Views	Score OR (95% CI)	Score + Age OR (95% CI)
Overall Score	1.00(0.99, 1.01)	1.00(0.99, 1.01)
Age		1.07(1.06, 1.09)
Fatalism Score	1.01(1.00, 1.02)	1.01(1.00, 1.01)
Age		1.07(1.06, 1.09)
Self-Care Score	0.99(0.98, 1.00)	0.99(0.98, 1.00)
Age		1.07(1.06, 1.09)
Herb Use Score	0.99(0.98, 0.99)	0.99(0.98, 0.99)
Age		1.07(1.06, 1.09)
Western Medicine Score	0.99(0.99, 1.00)	1.00(0.99, 1.00)
Age		1.07(1.06, 1.09)

With a 10-point increase in the unadjusted fatalism subscale score (OR= 1.09; 95% CI: 1.01-1.19), there was a 9% increased likelihood for an individual to have received colorectal cancer screening (as shown in Table 3). On the other hand with a 10-point increase in the unadjusted herb use (OR= 0.91; 95% CI: 0.84-0.98) and self-care subscales (OR= 0.93; 95% CI: 0.87-1.00), there was a 9%

and 7% decreased likelihood, respectively, for an individual to have received colorectal cancer screening. After adjusting for age, herb use remained significantly associated with colorectal cancer screening, while self-care remained marginally significant. With a 10-point increase in the age-adjusted herb use and self-care score, a 12% (OR= 0.88; 95% CI: 0.82-0.97) and 7 % (OR= 0.93; 95% CI: 0.87-1.00) decreased likelihood, respectively, for an individual to have received colorectal cancer screening.

Table 3. Unadjusted and age-adjusted odds ratios for colorectal cancer screening by 10 point increases in continuous Asian cultural views scores (n=858)

Continuous Asian Cultural Views	Score OR (95% CI)	Score + Age OR (95% CI)
Overall Score	1.02 (0.92, 1.14)	0.96 (0.86, 1.08)
Fatalism Score	1.09 (1.01, 1.19)	1.04 (0.95, 1.14)
Self-Care Score	0.93 (0.87, 1.00)	0.93 (0.87, 1.00)
Herb Use Score	0.91 (0.84, 0.98)	0.88 (0.82, 0.97)
Western Medicine Score	0.97 (0.91, 1.05)	0.95 (0.88, 1.03)

For the Asian cultural views scores as categorical variables, fatalism was only significant when comparing the Asian and Western groups with those having more Asian cultural views of cancer having 1.95 times greater odds of receiving colorectal cancer screening as compared to those with more Western cultural views (OR= 1.95; 95% CI: 1.15-3.31) (as shown in Table 4). In addition, self-care and herb use were found to be significantly associated with colorectal cancer screening even after adjusting for age. A gradient effect was observed for both subscales with a stronger inverse association between individuals having more

Asian cultural views vs. western cultural views as compared to those who have neutral cultural views vs. western cultural views. For example examining herb use, there was a 78% decreased odds of receiving CRC screening among those with more Asian cultural views than those with more Western cultural views (OR=0.22; 95% CI: 0.06-0.77), whereas there was a 32% decreased odds for individuals with Neutral cultural views than those with more Western cultural views (OR=0.68; 95% CI: 0.47-0.99).

Table 4. Unadjusted and age-adjusted odds ratios from the logistic regression models for categorical cultural views scores and colorectal cancer screening (n=858)

Categorical Asian Cultural Views	Score OR (95% CI)	Score + Age OR (95% CI)
Overall Score		
Asian vs. Western	1.17(0.75, 1.83)	0.96(0.59, 1.55)
Neutral vs. Western	0.88(0.57, 1.36)	0.85(0.53, 1.36)
Age		1.07(1.06, 1.09)
Fatalism Score		
Asian vs. Western	1.95(1.15, 3.31)	1.42(0.80, 2.53)
Neutral vs. Western	1.05(0.67, 1.63)	1.04(0.64, 1.67)
Age		1.07(1.06, 1.09)
Self-Care Score		
Asian vs. Western	0.56(0.32, 0.99)	0.49(0.26, 0.90)
Neutral vs. Western	0.63(0.43, 0.93)	0.65(0.43, 0.98)
Age		1.07(1.06, 1.09)
Herb Use Score		
Asian vs. Western	0.29(0.09, 0.97)	0.22(0.06, 0.77)
Neutral vs. Western	0.70(0.49, 0.99)	0.68(0.47, 0.99)
Age		1.07(1.06, 1.09)
Western Medicine Score		
Asian vs. Western	0.91(0.59, 1.41)	0.80(0.50, 1.28)
Neutral vs. Western	1.03(0.71, 1.50)	1.02(0.68, 1.53)
Age		1.07(1.06, 1.09)

Table 5 shows the adjusted odds ratios from the logistic regression models for continuous cultural views scores and colorectal cancer screening. The logistic regression models are adjusted for age, SL-ASIA, gender, ethnicity, education, income, marital status, health status, having health insurance, and having a regular physician. None of the Asian cultural views were found to be significant when adjusting for all covariates. Age, insurance, and having a regular physician were the only significant odds ratios for all cultural views scores, with the exception of fatalism where SL-ASIA was also significant (OR=1.61; 95% CI: 1.01-2.57). Similar results were found for the adjusted odds ratios from the logistic regression models for categorical cultural views scores and colorectal cancer screening, which are illustrated in Table 6.

In general, the association between most of the Asian cultural views scores and colorectal cancer screening immediately became marginally significant or insignificant after adjusting for age. In addition when taking into account continuous and categorical scores, there were no Asian cultural views scores that were significantly associated with colorectal cancer screening after controlling for age, SL-ASIA, gender, ethnicity, education, income, marital status, health status, having health insurance, and having a regular physician. Health care factors including having health insurance and having a regular physician were found to exhibit strong confounding effects, particularly when Asian cultural scores were examined as categorical variables. For instance when examining the unadjusted self-care score as a categorical variable, there was a 44% decreased odds of receiving colorectal cancer screening among those with more Asian cultural views

than those with more Western cultural views (OR= 0.56; 95% CI: 0.32-0.99) (Table 4). However, there was a 38% decreased odds after adding only insurance becoming statistically not significant (OR= 0.62; 95% CI: 0.35-1.11), and a 31% decreased odds when adding only having a regular physician also becoming statistically not significant (OR= 0.69; 95% CI: 0.39-1.24) (not shown in tables).

Acculturation, as measured by SL-ASIA, also exhibited a fairly strong confounding effect, particularly for the herb use score. When examining the herb use score as a categorical variable, the odds ratio decreased by about 14% after adjusting for only SL-ASIA. Those with more Asian cultural views had a 71% decreased odds of receiving colorectal cancer screening than those with more Western cultural views (OR= 0.29; 95% CI: 0.09-0.97) (Table 4). However after adjusting for SL-ASIA, those with more Asian cultural views had a 75% decreased odds of receiving colorectal cancer screening than those with more Western cultural views (OR= 0.25; 95% CI: 0.07-0.84) (not shown in tables).

In the final multivariate-adjusted models, having insurance, having a regular physician and acculturation were the only variables to have significant associations with colorectal cancer screening. Strong associations were observed for the two health care factors, having insurance and having a regular physician. For example when examining the final model for categorical self-care score, those with insurance and a regular physician had 2.27 (OR=2.27, 95% CI: 1.35-3.80) and 1.72 (OR= 1.72; 95% CI: 1.05-2.82) times the odds, respectively, of having received colorectal cancer screening as compared to those without insurance or without a regular physician (Table 6). In addition for acculturation, as measured

by SL-ASIA, the association with colorectal cancer screening was especially strong for the fatalism domain. For example with every point increase in SL-ASIA, the odds of having received colorectal cancer screening increased by 1.61 (OR=1.61; 95% CI: 1.01-2.57) and 1.63 (OR=1.63; 95% CI: 1.02-2.60) times for the continuous and categorical fatalism scores, respectively, in the final models (Table 5 and Table 6).

In Table 7, the results from the additional analysis investigating the age restricted sub-dataset are shown. The odds ratios in the table are from the logistic regression models for continuous cultural views scores and colorectal cancer screening, specifically examining subjects aged 50 years and older. There were no major differences in the odds ratios found using the full dataset, which included all participants 18 years and older, and the restricted sub-dataset of participants 50 years and older. The primary change occurred in the self-care domain, which was marginally significant after adjusting for age when examining participants 18 years and older. However, self-care was no longer significant at all, including for the unadjusted odds ratios, when examining only those 50 years and older.

Table 5. Odds ratios from the logistic regression models for continuous cultural views scores and colorectal cancer screening adjusting for all covariates (n=858)

	Overall OR (95% CI)	Fatalism OR (95% CI)	Self-Care OR (95% CI)	Herb Use OR (95% CI)	Western Medicine OR (95% CI)
Cultural Views Score	1.00(0.99, 1.01)	1.01(1.00, 1.02)	1.00(0.99, 1.01)	0.99(0.98, 1.00)	1.00(0.99, 1.01)
Age	1.09(1.07, 1.11)	1.09(1.07, 1.11)	1.09(1.07, 1.11)	1.09(1.06, 1.11)	1.09(1.07, 1.11)
Insurance (yes vs. no)	2.21(1.32, 3.70)	2.14(1.28, 3.58)	2.24(1.34, 3.75)	2.18(1.30, 3.64)	2.22(1.33, 3.71)
Regular (yes vs. no)	1.83(1.12, 2.99)	1.86(1.14, 3.05)	1.77(1.08, 2.91)	1.83(1.12, 2.99)	1.83(1.12, 2.99)
SL-ASIA	1.55(0.97, 2.47)	1.61(1.01, 2.57)	1.51(0.95, 2.40)	1.48(0.93, 2.36)	1.51(0.95, 2.40)
Gender (female vs. male)	1.15(0.77, 1.71)	1.15(0.77, 1.71)	1.14(0.76, 1.69)	1.18(0.79, 1.76)	1.16(0.78, 1.72)
Ethnicity					
Chinese vs. Korean	1.07(0.64, 1.78)	1.09(0.65, 1.83)	1.08(0.64, 1.80)	1.14(0.68, 1.92)	1.06(0.63, 1.76)
Vietnamese vs. Korean	1.29(0.78, 2.14)	1.29(0.78, 2.14)	1.27(0.77, 2.10)	1.20(0.72, 2.00)	1.22(0.72, 2.04)
Education					
college vs. less than high school	1.20(0.59, 2.44)	1.28(0.63, 2.61)	1.16(0.57, 2.36)	1.15(0.56, 2.33)	1.2(0.59, 2.43)
some college vs. less than high school	1.24(0.54, 2.85)	1.30(0.57, 2.98)	1.21(0.53, 2.78)	1.19(0.52, 2.73)	1.24(0.54, 2.83)
high school vs. less than high school	1.51(0.80, 2.86)	1.56(0.82, 2.95)	1.47(0.78, 2.78)	1.45(0.77, 2.74)	1.48(0.79, 2.80)
Income					
$20,000-$49,999 vs. less than $19,999	0.75(0.42, 1.34)	0.73(0.41, 1.31)	0.75(0.42, 1.33)	0.74(0.41, 1.32)	0.76(0.42, 1.35)
$50,000-$74,999 vs. less than $19,999	1.01(0.49, 2.08)	0.99(0.48, 2.04)	0.99(0.48, 2.04)	0.95(0.46, 1.97)	1.02(0.49, 2.10)
$75,000-$99,999 vs. less than $19,999	0.55(0.25, 1.21)	0.55(0.25, 1.22)	0.53(0.24, 1.17)	0.53(0.24, 1.18)	0.55(0.25, 1.22)
≥ $100,000 vs. less than $19,999	0.68(0.33, 1.41)	0.67(0.32, 1.40)	0.67(0.32, 1.39)	0.64(0.31, 1.35)	0.68(0.33, 1.41)
missing vs. less than $19,999	0.47(0.15, 1.44)	0.47(0.16, 1.45)	0.47(0.15, 1.44)	0.44(0.14, 1.36)	0.46(0.15, 1.43)
Marital					
never married vs. married	0.78(0.34, 1.78)	0.78(0.34, 1.78)	0.78(0.34, 1.78)	0.78(0.34, 1.78)	0.78(0.34, 1.79)
unmarried vs. married	0.82(0.43, 1.56)	0.82(0.43, 1.56)	0.82(0.43, 1.55)	0.78(0.41, 1.48)	0.81(0.43, 1.54)
Health (good vs. poor)	1.27(0.82, 1.98)	1.28(0.82, 1.99)	1.00(0.99, 1.01)	1.28(0.82, 2.00)	1.26(0.81, 1.97)

Table 6. Odds ratios from the logistic regression models for categorical cultural views scores and colorectal cancer screening adjusting for all covariates (n=858)

	Overall OR (95% CI)	Fatalism OR (95% CI)	Self-Care OR (95% CI)	Herb Use OR (95% CI)	Western Medicine OR (95% CI)
Cultural Views Score					
Asian vs. Western	1.19(0.70, 2.02)	1.83(0.98, 3.42)	0.59(0.31, 1.15)	0.36(0.10, 1.31)	0.92(0.55, 1.55)
Neutral vs. Western	0.94(0.57, 1.56)	1.22(0.73, 2.02)	0.80(0.52, 1.24)	0.77(0.50, 1.17)	1.04(0.67, 1.61)
Age	1.09(1.07, 1.11)	1.09(1.07, 1.11)	1.09(1.07, 1.11)	1.09(1.06, 1.11)	1.09(1.07, 1.11)
Insurance (yes vs. no)	2.17(1.30, 3.64)	2.13(1.27, 3.58)	2.27(1.35, 3.80)	2.13(1.27, 3.57)	2.21(1.33, 3.70)
Regular (yes vs. no)	1.85(1.13, 3.02)	1.88(1.14, 3.08)	1.72(1.05, 2.82)	1.82(1.11, 2.97)	1.82(1.11, 2.97)
SL-ASIA	1.57(0.98, 2.51)	1.63(1.02, 2.60)	1.49(0.93, 2.37)	1.49(0.94, 2.37)	1.52(0.96, 2.42)
Gender (female vs. male)	1.14(0.77, 1.70)	1.14(0.77, 1.70)	1.12(0.75, 1.67)	1.18(0.79, 1.76)	1.15(0.77, 1.71)
Ethnicity					
Chinese vs. Korean	1.07(0.64, 1.79)	1.10(0.66, 1.84)	1.08(0.65, 1.80)	1.13(0.68, 1.90)	1.07(0.64, 1.78)
Vietnamese vs. Korean	1.30(0.78, 2.17)	1.30(0.78, 2.16)	1.27(0.77, 2.10)	1.23(0.74, 2.06)	1.27(0.76, 2.15)
Education					
college vs. less than high school	1.25(0.61, 2.54)	1.31(0.64, 2.68)	1.13(0.56, 2.30)	1.13(0.56, 2.29)	1.19(0.59, 2.42)
some college vs. less than high school	1.27(0.55, 2.91)	1.32(0.57, 3.02)	1.20(0.52, 2.75)	1.17(0.51, 2.67)	1.23(0.54, 2.82)
high school vs. less than high school	1.55(0.82, 2.95)	1.61(0.84, 3.07)	1.43(0.75, 2.70)	1.46(0.77, 2.76)	1.48(0.78, 2.80)
Income					
$20,000-$49,999 vs. less than $19,999	0.73(0.41, 1.30)	0.73(0.41, 1.30)	0.75(0.42, 1.34)	0.76(0.42, 1.36)	0.75(0.42, 1.35)
$50,000-$74,999 vs. less than $19,999	0.98(0.47, 2.04)	0.96(0.46, 2.00)	0.98(0.47, 2.03)	0.98(0.47, 2.03)	1.01(0.49, 2.10)
$75,000-$99,999 vs. less than $19,999	0.54(0.24, 1.20)	0.55(0.25, 1.21)	0.52(0.24, 1.16)	0.55(0.25, 1.22)	0.55(0.25, 1.21)
≥ $100,000 vs. less than $19,999	0.66(0.32, 1.37)	0.67(0.32, 1.39)	0.67(0.32, 1.39)	0.67(0.32, 1.41)	0.68(0.33, 1.42)
missing vs. less than $19,999	0.47(0.15, 1.44)	0.47(0.15, 1.45)	0.49(0.16, 1.51)	0.45(0.15, 1.38)	0.47(0.15, 1.45)
Marital					
never married vs. married	0.78(0.34, 1.79)	0.77(0.34, 1.76)	0.78(0.34, 1.80)	0.81(0.35, 1.87)	0.78(0.34, 1.79)
unmarried vs. married	0.82(0.43, 1.56)	0.80(0.42, 1.53)	0.81(0.42, 1.55)	0.79(0.42, 1.51)	0.82(0.43, 1.57)
Health (good vs. poor)	1.31(0.84, 2.04)	1.27(0.82, 1.98)	1.30(0.83, 2.03)	1.27(0.81, 1.98)	1.27(0.81, 1.98)

Table 7. Odds ratios from the logistic regression models for continuous cultural views scores and colorectal cancer screening adjusting for all covariates (restricting the dataset to subjects aged 50 and over) (n=858)

	Overall OR (95% CI)	Fatalism OR (95% CI)	Self-Care OR (95% CI)	Herb Use OR (95% CI)	Western Medicine OR (95% CI)
Cultural Views Score	1.00(0.98, 1.02)	1.01(0.99, 1.02)	1.00(0.99, 1.01)	0.99(0.98, 1.00)	1.00(0.99, 1.01)
Age	1.07(1.02, 1.12)	1.07(1.02, 1.12)	1.07(1.02, 1.12)	1.07(1.02, 1.12)	1.07(1.02, 1.12)
Insurance (yes vs. no)	1.93(0.96, 3.87)	1.87(0.93, 3.76)	1.95(0.98, 3.89)	1.98(0.99, 3.94)	1.93(0.97, 3.85)
Regular (yes vs. no)	3.28(1.53, 7.06)	3.37(1.56, 7.27)	3.24(1.50, 6.99)	3.19(1.49, 6.83)	3.27(1.53, 6.99)
SL-ASIA	1.74(0.91, 3.33)	1.83(0.96, 3.50)	1.71(0.91, 3.21)	1.60(0.85, 3.00)	1.73(0.92, 3.26)
Gender (female vs. male)	0.89(0.48, 1.66)	0.90(0.48, 1.69)	0.89(0.47, 1.66)	0.92(0.49, 1.73)	0.89(0.48, 1.66)
Ethnicity					
Chinese vs. Korean	0.70(0.31, 1.58)	0.74(0.33, 1.66)	0.70(0.31, 1.56)	0.75(0.34, 1.70)	0.70(0.31, 1.57)
Vietnamese vs. Korean	1.72(0.83, 3.57)	1.76(0.86, 3.63)	1.70(0.83, 3.49)	1.57(0.76, 3.24)	1.73(0.82, 3.68)
Education					
college vs. less than high school	1.36(0.53, 3.53)	1.42(0.54, 3.71)	1.36(0.53, 3.50)	1.31(0.51, 3.39)	1.35(0.52, 3.49)
some college vs. less than high school	0.59(0.18, 1.94)	0.62(0.19, 2.05)	0.59(0.18, 1.93)	0.55(0.17, 1.83)	0.58(0.18, 1.92)
high school vs. less than high school	1.20(0.55, 2.61)	1.24(0.57, 2.71)	1.19(0.55, 2.56)	1.12(0.52, 2.43)	1.20(0.56, 2.58)
Income					
$20,000-$49,999 vs. less than $19,999	0.58(0.26, 1.29)	0.57(0.25, 1.27)	0.57(0.26, 1.29)	0.59(0.26, 1.32)	0.58(0.26, 1.28)
$50,000-$74,999 vs. less than $19,999	0.94(0.33, 2.72)	0.92(0.32, 2.67)	0.93(0.32, 2.71)	0.85(0.29, 2.48)	0.94(0.33, 2.72)
$75,000-$99,999 vs. less than $19,999	0.85(0.25, 2.95)	0.84(0.24, 2.90)	0.84(0.24, 2.94)	0.86(0.25, 2.99)	0.85(0.25, 2.95)
≥ $100,000 vs. less than $19,999	1.09(0.30, 3.93)	1.07(0.30, 3.88)	1.08(0.30, 3.92)	1.06(0.29, 3.86)	1.10(0.30, 3.98)
missing vs. less than $19,999	0.21(0.05, 0.98)	0.22(0.05, 0.99)	0.22(0.05, 0.98)	0.20(0.04, 0.91)	0.21(0.05, 0.97)
Marital					
never married vs. married	2.49(0.48, 12.94)	2.34(0.45, 12.11)	2.53(0.5,12.94)	3.19(0.59, 17.16)	2.49(0.49, 12.82)
unmarried vs. married	0.74(0.34, 1.61)	0.74(0.34, 1.60)	0.74(0.34, 1.60)	0.69(0.31, 1.50)	0.75(0.34, 1.61)
Health (good vs. poor)	1.29(0.68, 2.44)	1.28(0.67, 2.42)	1.29(0.68, 2.44)	1.29(0.68, 2.44)	1.29(0.68, 2.44)

Chapter 5: Discussion

The prevalence of colorectal cancer screening was found to be lower among our sample of Asian Americans as compared to data provided by the California Health Interview Survey (CHIS) as well as National Health Interview Survey (NHIS).[34, 35] In our sample, only 21.3% of Chinese (n=63), 21.2% of Koreans (n=61), and 22.3% of Vietnamese (n=61) reported having received any colorectal cancer screening test in the past two years, whereas merged data from the 2001, 2003, and 2005 CHIS found that 50.7% of Chinese (n=1,429) 32.7% of Koreans (n=677), and 46.6% of Vietnamese (n=704) reported having had any colorectal cancer screening test within the past five years.[35] These differences in screening proportions may be attributable to the different time frames used by each study (i.e., in the past two years as opposed to within the past five years). In addition, according to the 2010 National Health Interview Survey (NHIS) about 59.8% of Whites (n=6,813) and 55.0% of African Americans (n=1,524) were up-to-date on colorectal cancer screening as compared to only 46.9% of Asian Americans (n=472).[34] Up-to-date screening was determined based on adherence to the previously noted U.S. Preventive Services Task Force guidelines.

This study found that after adjusting for age, the domains of herb use and self-care had significant associations with colorectal cancer screening behavior among Asian Americans. When evaluated as categorical variables and adjusted for age, the observed gradient effect for both subscales supports the finding that those with more Asian cultural views of cancer are less likely to receive colorectal cancer screening as compared to those with Neutral or Western cultural views.

Previous studies have suggested that culture can influence conceptions about cancer through beliefs, attitudes, and behaviors related to prevention and screening, but there are few studies examining the influence of Asian cultural views of cancer on colorectal cancer screening behaviors.[36] Most of these studies examined the association of fatalism or the overall scale in relation to colorectal cancer screening, but did not note the relationship between herb use and self-care with screening.

Unlike other studies which found fatalism to be significantly associated with colorectal cancer screening, fatalism was only found to be significant in the univariate analysis.[31] After adjusting for age, fatalism was not longer considered to be significant. Among the Asian cultural views domains, fatalism had the highest Cronbach's alpha value of 0.82, and has also been found to influence colorectal screening among other minority groups, specifically African Americans, Hispanic Americans, and Asian Americans.[31, 37] Previous studies have typically found fatalism scores to be inversely related with the likelihood of receiving cancer screening.[8, 31] However in this study, those with higher fatalism scores were more likely to receive colorectal cancer screening contrary to the original hypothesis. This study was limited to the data available and could not take into account factors such as a physician's recommendation for colorectal cancer screening, which has been found to be a strong predictive factor.[10] Other factors that were not included in this analysis but have been used in other studies include: having colon and rectum related symptoms, worry about getting colon cancer, and thoughts about getting colon cancer.

In a previous study examining Chinese women 50 years and older, individuals with more Asian cultural views, as measured by the overall score, were less likely to have recently received colorectal screening.[10] However, the unadjusted and adjusted overall scores, when examined as both a continuous and categorical variable, were not found to be significantly associated with colorectal cancer screening in the current study. The one variable that was not controlled for in this previous study is acculturation, which has also been found to influence colorectal screening among Asian Americans.[38]

Although significant interaction was found between Asian cultural views and education in a previous study examining colorectal cancer in Chinese women, no significant interactions were found in this study.[10] Interaction between education and colorectal screening was expected, but no interactions were found between Asian cultural views and not only education but also having insurance, having a regular physician, gender, ethnicity, income and health status.

Similar to previous studies, a strong and significant association between having health insurance and a usual source of care with receiving colorectal cancer screening was found.[15, 39] These health care factors in addition to age were found to be strong confounders. The association between Asian cultural views scores and colorectal cancer screening became insignificant after adjusting for age, having insurance, and having a regular physician indicating the strong role of age and health care factors in receiving colorectal cancer screening. Even when taking the USPSTF guidelines into account and restricting the dataset to subjects 50 years and over, the association between most Asian cultural views scores and

screening became insignificant after adjusting for age. In examining this sub-dataset, the exception was the herb use score which remained significant even after adjusting for age, having insurance, and having a regular physician. It was only after adjusting for acculturation that the association between herb use and screening became insignificant. The crude odds ratio of 0.98 (95% CI: 0.97-0.99) became 0.99 (95% CI: 0.98- 1.00) after SL-ASIA was added to the model in addition to age and the health care factors, which demonstrates the confounding from acculturation in the association between Asian cultural views and colorectal cancer screening. Previous studies have found acculturation as measured by various proxies, such as English proficiency and proportion of life in the U.S., to be associated with colorectal cancer screening.[27, 40]

When examining all datasets, no significant associations were found between higher educational attainment and higher income with receipt of colorectal cancer screening as in other studies.[15,41] Moreover, the prevalence of having any recent colorectal cancer tests has been found to be significantly different for men and women, with more men receiving screening, but no significant gender differences were found.[41] Married adults have also been found to be more likely to receive colorectal screening as compared to non-married adults, although this was not true for the current study.[42]

Following the U.S. Preventive Services Task Force (USPSTF) guidelines for colorectal cancer screening, a sub-dataset was created that was limited to subjects aged 50 and older. However, no major differences were found when comparing the results to those found using the full dataset. The dissimilarity

found between the sub-dataset and full dataset with regards to the self-care domain may allude to differences among those under age 50 who receive colorectal cancer screening and those over age 50 who receive colorectal cancer screening. Given the screening recommendations, those over 50 are probably more likely to receive a physician's recommendation, which has been found to be a predictor of receiving screening, while those who receive colorectal screening at younger ages may have symptoms or other medical reasons that prompt them to receive screening.

For our sample, the scale developed by Liang et al. may not have been a good measure for assessing Asian cultural views, particularly when examining ethnic groups other than the Chinese population for which it was initially developed.[1] In a previous study examining the impact of fatalism on adherence to colon cancer screening among Asian Americans, Asian Americans had 0.53 times the odds (OR=0.53, 95% CI: 0.53-0.54) as compared to whites of adhering to colon cancer screening guidelines after adjust for demographics, health status, and health care access.[31] However after adjusting for fatalistic causal attributes in addition to the aforementioned variables, Asian Americans were found to have 2.0 times the odds (OR=2.0, 95% CI: 2.0-2.1) as compared to whites of adhering to colon cancer screening guidelines. This study considered having had a Fecal Occult Blood Test (FOBT) in the past year or sigmoidoscopy/colonoscopy within the past 10 years as adhering to colon cancer screening guidelines. Fatalistic attributes included whether an individual thought that they could "lower chances of getting colon cancer," that "everything causes colon cancer," "cancer is not

often caused by a person's heavier or lifestyle," and "there is no way to slow down or disrupt colon cancer." Findings from this study suggest that fatalistic views reduce colorectal cancer screening adherence. However, our study found the opposite with those having more fatalistic views being more likely to receive screening contrary to the existing literature.[10, 31, 37] The previous study did not specify the ethnic composition of their Asian American sample.

5.1 Strengths and Limitations

A major strength of the proposed study is that it examines the impact of cultural values on colorectal screening behavior among different Asian ethnic groups. A study by Wang et al. examined the association between cultural views and screening among Chinese Americans.[10] However from the literature reviewed, this appears to be the first study to utilize a scale to measure multiple domains of Asian cultural views among Korean and Vietnamese Americans in relation to colorectal cancer screening. In addition, this study explored the association with acculturation, as measured by SL-ASIA, which to the best of my knowledge has not been done in other studies examining the influence of cultural views on colorectal screening. Although nativity, years in the U.S., and language use at home have been treated as confounders in the association between ethnicity and colorectal screening, there have been few studies that included a comprehensive scale of acculturation in their analysis.[38] Previous studies examining colorectal screening have only examined one measure of acculturation (e.g., English fluency) as an independent variable and not explored possible confounding from acculturation scales.[10] Furthermore, the Asian cultural views

scale employed in this study has been used only among women. However, this study will include both genders.

This study has several limitations regarding the study design, sampling, and measurements that should be taken into account. First, causality cannot be inferred from the findings of this study due to the cross-sectional study design. Second, the sampling method limits the generalizability of findings given that a convenience sample was used to recruit the hard-to-reach population. Third, the scale may not capture all cultural components related to health and cancer since it was developed using responses from Chinese American women regarding their perceptions and experiences related to health and cancer in the United States. Finally, the outcome was assessed using self-report which could potentially introduce recall bias.

5.2 Public Health Significance

Despite recommendations by the USPSTF in favor of colorectal screening, rates for screening using the FOBT, sigmoidoscopy, or colonoscopy, are low among many Asian American populations.[14, 15] Although colorectal screening is well established as being an effective way to reduce colorectal cancer, Asian-American and Pacific Islanders (AAPIs) have been found to consistently report low screening rates.[15, 35, 43] For instance, data from the 2001 California Health Interview Survey (CHIS) found that Chinese (OR= 0.74, 95% CI: 0.57-0.96), Korean (OR=0.75, 95% CI: 0.51-1.12), and Vietnamese (OR=0.68, 95% CI: 0.52-0.88) have lower odds of having colorectal screening as compared to non-Hispanic whites.[38] In addition, only 46.2% of Chinese, 37.8% of Koreans, and

44.1% of Vietnamese received recent colorectal cancer screening as compared to 53.2% for all racial groups.[44] More recently, the 2005 CHIS found that about 77% of Korean adults 40 and older have never received any colorectal cancer screening compared to 55% of Asian Americans, 46% of the general population, and 39% of non-Hispanic whites.[15, 45]

Although colorectal incidence and mortality rates for Asian Americans are lower than non-Hispanic whites nationally, this aggregate data can be misleading.[46] Aggregation of the diverse Asian ethnic groups can mask vulnerable populations.[18] Differences among Asian ethnic groups can become lost in aggregate data highlighting the importance of examining each subgroup independently. Sociocultural values are linked to cancer outcomes through beliefs, attitudes, and behaviors related to prevention and screening as well as provider-patient relationships/interactions and adherence to medical treatments.[36] Unaddressed cultural beliefs combined with structural barriers in the U.S. healthcare system, such as lacking health insurance, can deter individuals from screening and early detection services, underscoring the need for studies, like the current study, that examine the relationship between cultural views and screening behaviors.[18]

5.3 Conclusion

The current study explored the relationship between Asian cultural views of health and cancer in relation to colorectal cancer screening behaviors. Findings from this study can be used to inform the development of future interventions for Chinese, Korean, and Vietnamese Americans that take into account specific

cultural views of cancer. Based on this study, messages that address the domains of herb use and self-care may be beneficial in addressing certain cultural barriers to screening. For instance, providing education on how effective screening tests can be in the early detection of colorectal cancer which can not be provided by herb use and how prevention is important and requires proactive healthcare seeking behavior as opposed to self-care. These culturally appropriate interventions, which consider cultural views that inhibit colorectal cancer screening behavior and debunk potential cultural myths, can potentially increase colorectal cancer screening among Asian Americans.

Appendix

Appendix A: Description of the 30-Item Cultural View Scale

Category	Item #	Statement
Fatalism (Cronbach's α = 0.82)	1	If I am meant to get cancer, I will get it.
	2	If we get cancer, the best way to deal with it is to accept it, just like the old saying: "Listen to heaven and follow fate."
	3	Health or illness is a matter of fate. Some people are always healthy; others get sick very often.
	4	I cannot control my destiny.
	5	Avoiding cancer is a matter of personal luck.
	6	No matter what I do, if I am going to get cancer, I will get it.
	7	It is hard to prevent cancer.
	8	Getting cancer is like being sentenced to death.
	9	It is best not to think about cancer. If we think about it too much, we probably will get cancer.
Self-care (Cronbach's α = 0.73)	10	As long as I can take good care of myself and keep myself healthy, I don't need to see a doctor.
	11	I don't visit doctors if I'm not feeling sick.
Use of herbs (Cronbach's α = 0.69)	12	Herbs are a better choice for preventing diseases than Western medicine.
	13	Herbs are more effective in harmonizing a person's yin–yang than Western medicine.
	14	Herbs are better remedy for illness than Western medicine.
Lifestyle (Cronbach's α = 0.59)	15	Regularity in meals and daily schedules can make us healthy.
	16	Keeping my mind happy, doing my hobbies, and not competing with others can lead to better health.
	17	Regular outdoor walking is essential to achieve good health.
Hot–cold balance (Cronbach's α = 0.53)	18	Certain food is not good for me because it will disturb the hot–cold balance in my body.
	19	Most diseases, excluding external wounds, are caused by the imbalance between hot and cold in a person's body.

	20	Eating “cold” food in summer and “hot” food in winter will help strengthen my body.
Medical examination (Cronbach’s α = 0.42)	21	I will be embarrassed if a doctor or a nurse checks my private parts.
	22	A lot of medical tests are too intrusive and make me uncomfortable.
	23	Medical doctors usually do unnecessary tests.
Western medicine (Cronbach’s α = 0.39)	24	We should not take “Western” medicine too often, because its chemical ingredients will hurt our bodies.
	25	Western medicine is good for killing germs rather than preventing diseases.
Miscellaneous	26	Eating food prepared by myself is a key to good health.
	27	I know my body better than anyone else.
	28	Bodily constitution is different for every person; therefore, some kinds of people are more likely to get cancer than others do.
	29	Going to clinics or hospitals too often will cause me to catch diseases or get bad luck.
	29	Chi-Kung or Tai-Chi practice can help regulate the chi in the body, which can increase one’s stamina and prevent diseases.
	30*	I know my body better than anyone else.

*Item was originally part of the self-care domain but was excluded to increase the domain’s Cronbach’s alpha from 0.628 to 0.727.

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